REMARKS/ARGUMENTS

The Pending Claims

Claims 1-5, 9, 13-26, and 32-38 are pending. Claims 13-18 have been withdrawn in response to a restriction requirement. Therefore, claims 1-5, 9, 19-26, and 32-38 are subject to examination.

The Amendments to the Claims

Claims 1, 3, and 35 have been amended to refer to "directly" light-controlled ion channels. These amendments are supported by the specification at, e.g., paragraphs 0009 and 0040. Claim 9 has been amended to incorporate the subject matter of claims 10 and 11. Claims 36-38 are new and correspond to claims 8, 11, and 12 rewritten in independent form including all of the limitations of the independent claim from which they depend and any intervening claim limitations. Claims 8 and 10-12 have been cancelled. Accordingly, no new matter has been added by way of these amendments.

The Office Action

Claims 9 and 10 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly lacking written description and enablement. Claims 1-4, 19-22, 24-26, 33, and 35 are rejected under U.S.C. § 102(e) as allegedly anticipated by U.S. Patent 7,144,733 ("the '733 patent"). Claims 1-4, 19, 21-26, and 32-35 are rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Abdulaev and Ridge, *Methods Enzymology*, *315*: 3-11 (2000) ("the Abdulaev and Ridge reference"), as evidenced by the '733 patent. Claims 1-5, 19, 21-22, 24-26, 33, and 35 are rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Han et al., *Biochemistry*, *37*: 8253-8261 (1998) ("the Han reference"), as evidenced by the '733 patent. Claims 8, 11, and 12 are objected to as depending from a rejected claim, but would be allowable if they were rewritten in independent form including all of the limitations of the independent claims and any intervening claim limitations.

Reconsideration of these rejections and objection is respectfully requested.

Discussion of the Rejections Under 35 U.S.C. § 112

Claims 9 and 10 have been rejected under Section 112, first paragraph, for allegedly lacking written description and enablement. With respect to the written description rejection, the Examiner alleges that the specification does not disclose sufficient structural characteristics of the broad genus of lower plants. With respect to the enablement rejection, the Examiner alleges that the specification does not enable an apoprotein "derived from" lower plants. While Applicants disagree with these rejections, claim 9 has been amended to incorporate the subject matter of claim 11, and no longer refers to an apoprotein derived from lower plants. Claim 10 has been cancelled. Accordingly, the written description and enablement rejections under Section 112, first paragraph, should be withdrawn.

Discussion of the Rejections Under 35 U.S.C. § 102

Claims 1-4, 19-22, 24-26, 33, and 35 are rejected under Section 102(e) as allegedly anticipated by the '733 patent. Claims 1-4, 19, 21-26, and 32-35 are rejected under Section 102(b) as allegedly anticipated by the Abdulaev and Ridge reference, as evidenced by the '733 patent. Claims 1-5, 19, 21-22, 24-26, 33, and 35 are rejected under Section 102(b) as allegedly anticipated by the Han reference, as evidenced by the '733 patent. These rejections are traversed for the reasons set forth below.

Claim 1, as amended, is directed to a method for increasing or decreasing the ion conductivity of a membrane, which method comprises inserting one or more *directly* light-controlled ion channels into a membrane, wherein the one or more *directly* light-controlled ion channels is a biological photoreceptor, and wherein the one or more directly light-controlled ion channels comprises an apoprotein and a light-sensitive polyene covalently bound to the apoprotein, said polyene interacting with the apoprotein and functioning as a direct light-sensitive gate.

The '733 patent discloses generating a light-controlled heterotrimeric G protein by modifying a heterotrimeric G protein in a non-photoreceptor cell. However, it was well known in the art that G proteins and corresponding signal transduction cascades do not directly form a mechanism for altering the conductivity of a membrane. Rather, a signal transduction cascade is initiated by the action of the G protein in cooperation with a receptor

to influence additional signaling components. The method disclosed in the '733 patent would influence the conductivity of an ion channel in a strict *indirect* manner, as the initial interaction between the photons, the G protein, and the final ion conductivity alteration are temporarily and spatially separated. In particular, the '733 patent does not disclose the formation of an ion channel which comprises a photoreceptor that is controllable by light in a *direct* manner, as required by the amended claims.

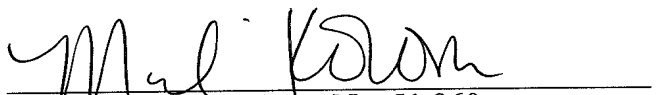
Similarly, the Abdulaev and Ridge reference and the Han reference are silent with respect to the *direct* light activation of an ion channel. The Abdulaev and Ridge reference discloses the expression of bovine opsin in yeast cells, while the Han reference discloses making mutations in opsin in order to analyze the function of G protein-coupled receptors.

In view of the foregoing, none of the cited references discloses or suggest the invention defied by the amended claims. As such, Applicants request withdrawal of the anticipation rejections under Section 102.

Conclusion

Applicants respectfully submit that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned agent.

Respectfully submitted,



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